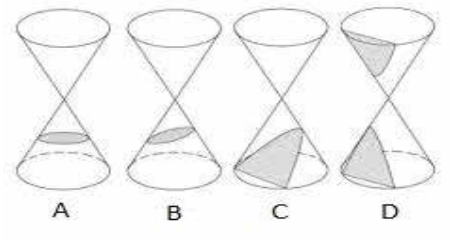
Conic Sections

TEST 1

1. **Which of the following cutting of a cone represents a circle?**



- A: A
- B: B
- C: C
- D: D

2. **Eccentricity of ellipse is?**

- A: Equal to 1.
- B: Greater than zero and less than 1.
- C: Greater than one.
- D: Zero

3. **Center and radius of the circle represented by $x^2 + y^2 = 9$ is?**

- A: (1,1) and 9
- B: (1,1) and 3
- C: (0,0) and 9
- D: (0,0) and 3

4. **Equation of a circle cannot have a term?**

- A: x
- B: y
- C: xy
- D: All of the above.

5. **The center of the circle represented by the equation $(x - 3)^2 + (y + 4)^2 = 4$ is?**

- A: (3,4)
- B: (-3,-4)
- C: (-3,4)
- D: (3,-4)

6. **What is the focus of the ellipse $x^2/16 + y^2/4 = 1$?**

- A: $(\pm 2\sqrt{3}, 0)$
- B: $(\pm \sqrt{3}, 0)$.
- C: $(\pm 2\sqrt{5}, 0)$.
- D: $(\pm \sqrt{5}, 0)$.

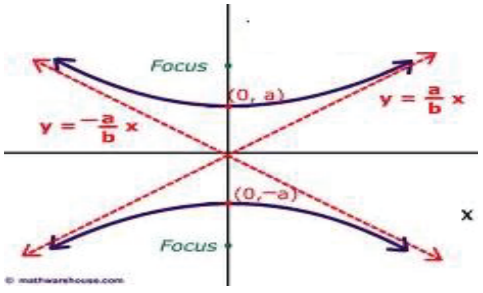
7. **The plane cutting a double cone as shown in the figure below would get a/an?**

- A: Circle
- B: Parabola
- C: Hyperbola
- D: Ellipse

8. **The equation $x^2/a^2 + y^2/b^2 = 1$ represents a verticle ellipse if?**

- A: $a^2 = b^2$
- B: $a^2 < b^2$
- C: $a^2 > b^2$
- D: None of the above.

9. The equation of the given hyperbola is of form?

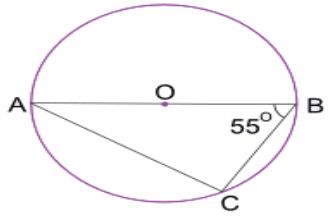


- A: $x^2/a^2 + y^2/b^2 = 1$
- B: $x^2/b^2 + y^2/a^2 = 1$
- C: $x^2/a^2 - y^2/b^2 = 1$
- D: $y^2/a^2 - x^2/b^2 = 1$

10. When the cutting of a conic section is parallel to the axis of the cone and intersects both nappes, it represents a/an?

- A: Circle
- B: Parabola
- C: Hyperbola
- D: Ellipse

11. What is angle CAB in the given figure?



- A: 35^o
- B: 45^o
- C: 55^o
- D: 65^o

12. A line y = mx + c intersects a circle $x^2 + y^2 = a^2$. The point of intersection are imaginary if?

- A: $a^2 (1+m^2) – c^2 > 0$
- B: $a^2 (1+m^2) – c^2 = 0$
- C: $a^2 (1+m^2) – c^2 < 0$
- D: Intersection points are never imaginary.

13. If a circle is represented by the equation $x^2 + y^2 + 4x - 6y - 12 = 0$. Then the point (-5,6) is?

- A: Inside the circle
- B: Outside the circle.
- C: On the circle.
- D: Center of the circle.

14. Circle is a special case of ellipse with eccentricity = ?

- A: -1
- B: 0
- C: 1
- D: 2

15. The parametric form of equation (a cos Θ, b sin Θ) is for?

- A: Circle
- B: Hyperbola
- C: Ellipse
- D: Parabola

16. Equation of the directrices of hyperbola $y^2/a^2 - x^2/b^2 = 1$ is given by?

- A: $x = \pm c/e^2$
- B: $x = \pm b/e$
- C: $y = \pm c/e^2$
- D: $y = \pm b/e$

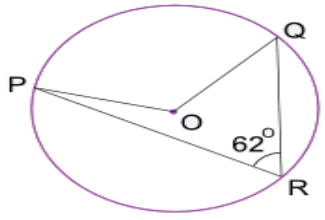
17. If e > 1 then the conic section is a?

- A: Parabols
- B: Ellipse
- C: Hyperbola
- D: Circle.

18. If a plane cutting one section of a double cone is slightly tilted and not parallel to the generator of the cone, we get a/an?

- A: Circle
- B: Parabola
- C: Hyperbola
- D: Ellipse

19. What is the angle POQ in the given diagram?



- A: 62°
- B: 102°
- C: 124°
- D: 132°

20. Focal chord perpendicular to the axis of the parabola is called?

- A: Directrix.
- B: Tangent Chord
- C: Latusrectum.
- D: Vertex.

TEST 2

1. **For a general form of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, the radius is given by?**

- A: g + f + c
- B: $\sqrt{g^2 + f^2}$
- C: $\sqrt{g^2 + f^2 - c}$
- D: $\sqrt{g^2 + f^2 + c}$

What is the eccentricity of the ellipse given by equation x /9 + y /4 = 1?

- A: 5/3
- B: √5/3
- C: 2/3
- D: √2/3

2. The equations $x = at^2$, y = at; t ∈ R represents?

- A: A circle
- B: A parabola
- C: A hyperbola
- D: An ellipse

3. Intersecting properties of conic sections were discovered by?

- A: Pythagoras
- B: Eudoxus and Georg Cantor
- C: Euclid
- D: Apollonius and Pappus

4. What are the coordinates of the focus of the parabola $x^2 - 4x - 8y - 4 = 0$?

- A: (2,-1)
- B: (2,1)
- C: (-2,-1)
- D: (2,0)

5. What is the focus of the parabola $4x - y^2 = 2y + 13$?

- A: (3,-1)
- B: (3,1)
- C: (4, 1)
- D: (4, -1)

6. **What are the foci of hyperbola $x^2/9 - y^2/4 = 1$?**

   A: $(\pm\sqrt{5}, 0)$ B: $(0, \pm\sqrt{5})$

   C: $(0, \pm\sqrt{13})$ D: $(\pm\sqrt{13}, 0)$

7. **The angle between the tangents drawn from the origin to the parabola $y^2 = 4a(x-a)$ is?**

   A: 90^o B: 60^o

   C: 45^o D: 30^o

8. **Equation of a line tangent to ellipse at $x^2/a^2 + y^2/b^2 = 1$ at points (4,10) is?**

   A: $4x/a^2 + 10y/b^2 = 1$ B: $10x/a^2 + 4y/b^2 = 1$

   C: $16x/a^2 + 100y/b^2 = 1$ D: $100x/a^2 + 16y/b^2 = 1$

9. **The line $y = 2x + c$ is tangent to the ellipse $x^2/16 + y^2/4 = 1$ if c equals?**

   A: $\sqrt{29}$ B: $\sqrt{60}$

   C: $\sqrt{68}$ D: $\sqrt{74}$

10. **What is the center of the ellipse $x^2 + 4y^2 + 4x - 24y + 24 = 0$?**

    A: (-2,3) B: (-2, -3)

    C: (2,3) D: (2,-3)

11. **Which of the following is not an equation of a circle?**

    A: $x^2 + y^2 - x + 98y + 11 = 4$ B: $x^2 + y^2 + 18x + 98y + 11 = 0$

    C: $5x^2 + 5y^2 + 14x + 12y - 10 = 0$ D: $x^2 + 3y^2 + 10x - 9y + 11 = 0$

12. **Latusrectum of the parabola $y^2 = -4ax$ is?**

    A: $x = a$ B: $x = -a$

    C: $y = a$ D: $y = -a$

13. **The equations $x = a \cos\theta$, $y = b \sin\theta$, $0 \leq \theta < 2\pi$, $a \neq b$, represents?**

    A: A circle B: A parabola

    C: A hyperbola D: An ellipse

14. **The vertex of the parabola $(y - a)^2 = 4a (x - a)$ is?**

    A: (0,a) B: (a,0)

    C: (0,0) D: None of the above.

15. **A second degree equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a parabola if?**

    A: $h^2 - ab = 0$ B: $h^2 - ab > 0$

    C: $h^2 - ab < 0$ D: None of the above.

16. **What is the length of the major axis for the ellipse $x^2/16 + y^2/4 = 1$?**

    A: 2 B: 4

    C: 6 D: 8

17. **The equation $y = mx + a/m$ is tangent to $y^2 = 4ax$ for m = ?**

    A: 0 B: 1

    C: All positive values D: All nonzero values

18. **What is the center of a circle represented by a general form $5x^2 + 5y^2 + 24x + 36y + 10 = 0$?**

    A: (-12/5 , -18/5) B: (12/5 , 18/5)

    C: (-9/5 , -7/5) D: (9/5 , 7/5)

19. The interior of a satellite dish has diameter 12 ft and 2 ft deep as shown in the figure below. What is the distance from the center of the dish to the focus?

- A: 4.5 ft
- B: 5.5 ft
- C: 6.0 ft.
- D: 6.2 ft

TEST 3

1. Minimum number of non-collinear points on a circle required to form an equation of a circle are?

- A: 2
- B: 3
- C: 4
- D: 5

2. The foci of an ellipse are (0, ± 1) and minor axis is of unit length. The equation of the ellipse is ?

- A: $2x^2 + 4y^2 = 5$
- B: $4x^2 + 2y^2 = 5$
- C: $15x^2 + 6y^2 = 1$
- D: $20x^2 + 4y^2 = 5$

3. The sum of distances of any point on the ellipse $3x^2 + 4y^2 = 24$ from its foci is?

- A: 8 units
- B: $2\sqrt{2}$ units
- C: $4\sqrt{2}$ units
- D: 7 units

4. The line $y + 2x - 5 = 0$ with respect to the circle $x^2 + y^2 + 2x - 9 = 0$?

- A: Cuts the circle at two distinct points.
- B: Tangent to the circle.
- C: Do not touch the circle.
- D: None of the above.

5. If the line $3x - 4y + 5 = 0$ is a tangent to the parabola $y^2 = 4ax$, then a is equal to?

- A: 15/16
- B: 9/7
- C: 5/4
- D: 2/3

6. What is the equation of tangent to the circle $x^2 + y^2 + 5/3\,x - 13/3\,y + 2/3 = 0$ at (1, 10/3)?

- A: $21x - 33y + 89 = 0$
- B: $33x + 21y + 157 = 0$
- C: $8x + 46y - 22 = 0$
- D: $3x + 19y + 27 = 0$

7. What is the equation of a circle with diameter between two points A (2,3) and B (4,6)?

- A: $x^2 + y^2 + 3x - 9y - 23 = 0$
- B: $x^2 + y^2 - 9x - 2y + 11 = 0$
- C: $x^2 + y^2 - 6x - 9y + 26 = 0$
- D: Cannot be determined from the given information.

8. If e_1 and e_2 are eccentricities of the two hyperbolas $x^2/a^2 - y^2/b^2 = 1$ and $x^2/b^2 - y^2/a^2 = 1$ then?

- A: $e_1 = e_2$
- B: $e_1 * e_2 = 1$
- C: $e_1 + e_2 = 0$
- D: $1/e_1^2 + 1/e_2^2 = 1$

9. The line $y = 2x + c$ is a tangent to the parabola $y^2 = 16x$ if c equals?

- A: 2
- B: 1/2
- C: 0
- D: -1/2

10. The equation of the circle whose diameter is the latusrectum of the parabola $x^2 = 4y$ is?

- A: $x^2 + (y-1)^2 = 4$
- B: $(x-2)^2 + (y-1)^2 = 4$
- C: $y^2 + (x-1)^2 = 4$
- D: $y^2 + (x-1)^2 = 2$

11. Line y = 2c is a tangent to the parabola $y^2 = 4ax$ if c is equal to?

- A: 0
- B: 4
- C: 2a
- D: None of the above.

12. The line $5y + 12x - 39 = 0$ to the circle $x^2 + y^2 = 9$?

- A: Cuts the circle in two distinct points.
- B: Do not touch the circle
- C: Is tangent to circle
- D: Cuts the circle at two imaginary points

13. What is the equation of a circle passing through non collinear points A(5, 8) and B(-2,9)?

- A: $x^2 + y^2 + 4x - 12y - 20 = 0$
- B: $x^2 + y^2 + 4x - 9y - 15 = 0$
- C: $x^2 + y^2 + 9x - 7y + 3 = 0$
- D: Equation cannot be formed from the given information.

14. What is the focus of the ellipse given by the equation $9x^2 - 18x + 4y^2 + 8y - 23 = 0$?

- A: $(1, \pm\sqrt{5})$
- B: $(1,-1\pm\sqrt{5})$
- C: $(1,1\pm\sqrt{5})$
- D: $(1\pm\sqrt{5}, -1)$

15. $x = \frac{e^t + e^{-t}}{2}$, $y = \frac{e^t - e^{-t}}{2}$; $t \in R$ represents

- A: A circle
- B: A parabola
- C: A hyperbola
- D: An ellipse

16. The line y = mx + 1 is tangent to parabola $y^2 = 4x$ if m = ?

- A: 1
- B: 2
- C: 3
- D: 4

17. Slope of the normal at point $(at^2, 2at)$ of the parabola $y^2 = 4ax$ is?

- A: 1/t
- B: t
- C: -t
- D: -1/t

18. What is the equation of the asymptotes for the given hyperbola?

$4x^2 - 9y^2 - 32x - 18y + 19 = 0$.

- A: $(y + 1) = \pm 2/3 (x - 4)$
- B: $(y + 1) = \pm 4/9 (x - 4)$
- C: $(y - 1) = \pm 2/3 (x + 4)$
- D: $(y - 1) = \pm 4/9 (x + 4)$

19. The general equation of second degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a hyperbola if?

- A: $h^2 - ab < 0$
- B: $h^2 - ab = 0$
- C: $h^2 - ab > 0$
- D: None of the above.

20. The point on the curve $y^2 = x$, where the tangent line makes an angle of 45^o with the x-axis is?

- A: (3/4,1/2)
- B: (1/4,1/2)
- C: (1/4,3/2)
- D: (1,2)

TEST 4

1. **Parametric form of equation for a cricle is?**
   - A: (a sec Θ, b tan Θ)
   - B: (r cos Θ, r sin Θ)
   - C: (a cos Θ, b sin Θ)
   - D: (at^2 , 2at)

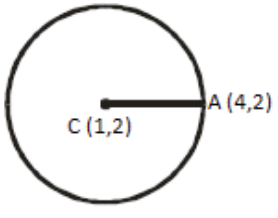
2. **What is the vertex of the parabola $y = -2x^2 + 4x + 1$?**
   - A: (2,1)
   - B: (-2,-1)
   - C: (-1,-3)
   - D: (1,3)

3. **If one foci of the ellipse is at (-3,0) and the ellipse is centered around the origin. What is the distance between the two foci of the ellipse?**
   - A: Cannot be determined.
   - B: 9
   - C: 6
   - D: 3

4. **What is the focus of the parabola $y^2 - x - 2y + 2 = 0$?**
   - A: (3/4 , 1)
   - B: (1/4 , 0)
   - C: (1/4 , 1)
   - D: (5/4 , 1)

5. **Axis of the parabola $9y^2 - 16x - 12y - 57 = 0$ is?**
   - A: 2/3
   - B: 3/2
   - C: -2/3
   - D: -3/2

6. **What is the equation of the circle given in the figure below?**



   - A: $(x - 1)^2 + (y - 2)^2 = 16$
   - B: $(x + 1)^2 + (y + 2)^2 = 9$
   - C: $(x - 1)^2 + (y - 2)^2 = 9$
   - D: $(x - 1)^2 + (y + 2)^2 = 16$

7. **Parametric form of equation for a parabola is?**
   - A: (r cos Θ, r sin Θ)
   - B: (at^2 , 2at)
   - C: (a cos Θ, b sin Θ)
   - D: (a sec Θ, b tan Θ)

8. **The equation of the parabola with focus at (0, a) and directrix $y + a = 0$ is ($a > 0$) ?**
   - A: $x^2 = 4ay$
   - B: $x^2 = -4ay$
   - C: $y^2 = 4ax$
   - D: $y^2 = -4ax$

9. **The two parabolas $x^2 = 4y$ and $y^2 = 4x$ meet in two distinct points. One of these is the origin and the other is?**
   - A: (4,4)
   - B: (2,2)
   - C: ($\sqrt{2}$, 2)
   - D: ($2\sqrt{2}$, 2)

10. **For a general equation $Ax^2 + By^2 + Gx + Fy + C = 0$, if A is not equal to B and both have opposite signs then it represents?**
    - A: Circle
    - B: Parabola
    - C: Hyperbola
    - D: Ellipse

11. The line $y = mx + c$ is tangent to the ellipse $x^2/a^2 + y^2/b^2 = 1$ if?

- A: $c = a/m$
- B: $c^2 = a^2 m^2 + b^2$
- C: $c^2 = a^2 m^2 - b^2$
- D: None of the above.

12. If a is the major axis, b is the minor axis and e is the eccentricity of an ellipse. Its directrices are given by?

- A: $\pm c/e$
- B: $\pm b/e$
- C: $\pm a/e$
- D: $\pm b/e^2$

13. The equation $(y - y_1)(x_1 + g) = (x - x_1)(y_1 + f)$ represents?

- A: Tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ at point (x_1 , y_1)
- B: Normal to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ at point (x_1 , y_1)
- C: Chord of a circle $x^2 + y^2 + 2gx + 2fy + c = 0$ through point (x_1 , y_1)
- D: None of the above.

14. If the length of major axis of ellipse is 2a and length of minor axis is 2b. Then the length if latusrectum is approximately?

- A: $4b/a$
- B: $4a^2/b$
- C: $2b^2/a$
- D: $a/2b$

15. When the cutting of a conic section is perpendicular to the axis of the cone, it represents a/an?

- A: Circle
- B: Parabola
- C: Hyperbola
- D: Ellipse

16. What is the length of the tangent from point (-5, 10) to the circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$?

- A: $\sqrt{29}$
- B: $\sqrt{67}$
- C: $\sqrt{102}$
- D: $\sqrt{133}$

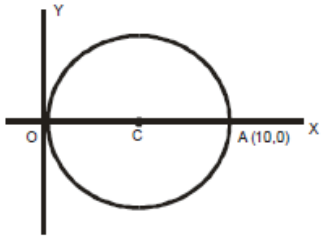
17. From a point P outside a circle, how many tangents can be drawn?

- A: 1
- B: 2
- C: 3
- D: 4

18. What is the radius of a circle represented by the equation $x^2 + y^2+12x - 10y = 0$?

- A: $\sqrt{61}$
- B: $\sqrt{55}$
- C: $\sqrt{52}$
- D: $\sqrt{47}$

19. Equation of the circle given in the figure below is?



- A: $x^2 + y^2 = 25$
- B: $(x-5)^2 + y^2 = 25$
- C: $(x + 5)^2 + y^2 = 25$
- D: $(x + 5)^2 + y^2 = 10$

20. Find the equation of an ellipse with centre (0,0), focus (0,-3) and one vertes at (0,4)?

- A: $x^2/16 + y^2/7 = 1$
- B: $x^2/7 + y^2/16 = 1$
- C: $x^2/\sqrt{7} + y^2/4 = 1$
- D: $x^2/7 + y^2/4 = 1$

Vectors

TEST 1

1. **What are the direction cosines of unit vector**

$$\hat{v} = \left[\frac{6}{\sqrt{41}}, \frac{-2}{\sqrt{41}}, \frac{1}{\sqrt{41}}\right]$$

- A: 0, 0, 0
- B: -6/√41 , +2/√41, -1/√41
- C: 6/√41 , -2/√41, 1/√41
- D: None of the above.

2. **If volume of a parallelepiped with a ,b , c as co-terminus edges is 36 the volume of the tetrahedron with the same edges is?**

- A: 13
- B: 12
- C: 6
- D: 3

3. **Value of [i, i , k] is?**

- A: 0
- B: 1
- C: -1
- D: √-1

4. **The value of $2i$ x $4k$ =?**

- A: 0
- B: 8k
- C: -8j
- D: 8j

5. **The volume of the parallelepiped with u , v and w as its coterminus edges is?**

- A: u.(v x w)
- B: 1/2 * u.(v x w)
- C: 1/6 * u.(v x w)
- D: u x (v x w)

6. **If ā is a unit vector. Then the value of ā.b̄ is? Assume that the two vectos are not perpendicular to each other.**

- A: 0
- B: 1
- C: ā cos θ
- D: b̄ cos θ

7. **Which of the following statement is true?**

- A: Only dot product possesses distributive property
- B: Only cross product possesses distributive property
- C: Both dot and cross product possess distributive property
- D: Neither dot nor cross product possess distributive property

8. **The value of $(2j \times i) - 3k$ = ?**

- A: -5k
- B: 5k
- C: k
- D: -k

9. **Find the magnitude of vector v = -3i + 4j ?**

- A: 2
- B: 3
- C: 4
- D: 5

10. **If terminal point of a vector coincides with its origin point then it is called?**

- A: Unit Vector.
- B: Null Vector.
- C: Equity Vector.
- D: Negative Vector.

11. If ā = [1,-3] and ƀ = [2,5] ; 4ā + 2ƀ = ?

- A: [3,2]
- B: [8,2]
- C: [-8,2]
- D: [8,-2]

12. If ā, ƀ and c are three vectors representing three edges of a parallelepiped. Its volume is given by?

- A: ā x ƀ x c
- B: ā . ƀ . c
- C: ā . (ƀ x c) / 2
- D: ā . (ƀ x c)

13. If three vectors are coplanar then their scalar triple product is?

- A: 0
- B: 1
- C: -1
- D: Equal to vector triple product.

14. i.j = ?

- A: 0
- B: 1
- C: -1
- D: k

15. If ā = i - k and ƀ = j + k then the projection of ā along ƀ is?

- A: -1/√2
- B: 1/√2
- C: 1
- D: -1

16. If k is a scalar ā x kƀ = ?

- A: kā x ƀ
- B: k (ā x ƀ)
- C: kā x kƀ
- D: Both A and B.

17. If ā = [2,1,3] and ƀ = [-1,4,0]. What is the magnitude of ā - 2ƀ?

- A: 16
- B: √74
- C: √93
- D: 36

18. What is the unit vector for v = 3i - j +2k?

- A: [3/√14 , 1/√14, 2/√14]
- B: [5/√37 , -2/√37, 7/√37]
- C: [1/√37 , 8/√37, -3/√37]
- D: [3/√14 , -1/√14, 2/√14]

19. The position vector of a point P(x, y, z) is denoted by?

- A: $\overrightarrow{PQ}$
- B: $\overrightarrow{P}$
- C: $\overrightarrow{OP}$
- D: All of the above.

20. k.k =?

- A: 0
- B: 1
- C: -1
- D: j

TEST 2

1. **If AB = i + j + k, AC = -4k and AD = i +2j - 8k then the volume of tetrahedron ABCD formed by the three vectors is?**

   A: 1 B: 2/3
   C: 2 D: 4

2. **What is the value of α such that αi + j , i + j + 3k and 2i + j - 2k are coplanar?**

   A: 1/3 B: 7/4
   C: 9/5 D: 8/5

3. If $\vec{a}, \vec{b}$ and $\vec{c}$ are vectors such that $|\vec{b}| = |\vec{c}|$, then $|(\vec{a}+\vec{b})\times(\vec{a}+\vec{c})\times(\vec{b}\times\vec{c})| =$

   A: 1 B: -1
   C: 0 D: 2

4. **(2j x 3i).k = ?**

   A: 0 B: 7
   C: 6 D: -6

5. **What is the vector perpendicular to both vectors ā = 2i - j + k and b̄ = 4i + 2j - k?**

   A: -i + 6j + 8k B: -2i + 3j + 9k
   C: 3i + 1j + 7k D: 5i - 3j + k

6. **If ā = 2i - 4j + 5k and b̄ = 4i + xj - 4k. What is the value of x if ā and b̄ are perpendicular to each other?**

   A: -1 B: -2
   C: -3 D: -4

7. **Which of these vectors are parallel?**

   a = 2i + 3j + k, b = 4i + 6j + 2k, c = 6i + 9j + 3k

   A: a and b B: a and c
   C: a, b and c all are parallel to each other.
   D: None of them is parallel.

8. **Unit vector perpendicular to i - j and i + j is?**

   A: k B: -k
   C: (i - j) / 2 D: (i + j) / √2

9. **Which of the following expressions is meaningful?**

   A: u.(v x w) B: (u.v) .w
   C: (u.v) . w D: None of the above.

10. **Zero vector is?**

    A: Parallel to every vector. B: Perpendicular to every vector.
    C: Both parallel and perpendicular to every vector.
    D: Is inverse of every vector.

TEST 3

1. **The point which divides the line joining (2, 4, 5) and (-3, 5, - 4) in the ratio 2 : 3, lies on?**

   A: XY plane
   B: YZ plane
   C: XZ plane
   D: None of the above.

2. **If result of two forces ā of magnitude (P) and b̄ of magnitude (Q) isperpendicular to ā and has magnitude P. Then the magnitude of b̄ is?**

   A: P
   B: P√2
   C: P√3
   D: 2P√3

3. **If ā x b̄ = ā x ē then which of the following is true?**

   A: ā, b̄ and ē are coplanar.
   B: ā, b̄ and ē are orthogonal
   C: b̄ = ē
   D: ā is parallel to b̄

4. **If $\vec{a}, \vec{b}, \vec{c}$ are unit coplanar vectors, then the scalar triple product $[2\vec{a} - \vec{b}\ 2\vec{b} - \vec{c}\ 2\vec{c} - \vec{a}] =$**

   A: 0
   B: 1
   C: √2
   D: √3

5. **If ā, b̄, ē, ō are the vertices of a square then?**

   A: b̄ - ā = ē – b̄
   B: ā + b̄ + ē = 0
   C: (ē - ā) . (ō - b̄) = 0
   D: None of the above.

6. **If the vectors a, b and c be the vectors representing the sides AB, BC and CA respectively of a triangle ABC, then?**

   A: a.(bxc) = 0
   B: (a.b) x c = (a.c) x b
   C: |a x b| = |a x c| = |b x c|
   D: |a x b| + |b x c| + |c x a| = 0

   Position vector a = 2i - 3j and b = 3i + 2j. What are the coordinates of position vector that divides the line between a and b in ration 4:3?

   A: 11/7 i + 8/7 j
   B: 1/7 i - 5/7 j
   C: 18/7 i - 1/7 j
   D: 23/7 i + 3/7 j

7. **The points (5, 2, 4), (6, −1, 2) and (8, −7, k) are collinear if k is equal to?**

   A: 3
   B: 2
   C: -1
   D: -2

8. **If A (-2,-3), B (1,4), C(0,-5) are three vertices of parallelogram ABCD. What are the coordinates of D if AB is parallel to DC?**

   A: (3,14)
   B: (-4,11)
   C: (-3, -12)
   D: (-4, 9)

9. **If $\vec{a}, \vec{b}, \vec{c}$ are vectors such that $\vec{c} = \vec{a} + \vec{b}$ and $\vec{a} \cdot \vec{b} = 0$, then**

   A: $a^2 + b^2 + c^2 = 0$
   B: $a^2 - b^2 = c^2$
   C: $a^2 + b^2 = 0$
   D: $c^2 = a^2 + b^2$

10. **The point having position vectors $2\hat{i}+3\hat{j}+4\hat{k}$, $3\hat{i}+4\hat{j}+2\hat{k}$, $4\hat{i}+2\hat{j}+3\hat{k}$ are the vertices of a triangle. The triangle is?**

- A: Right angled.
- B: Equilateral.
- C: Isosceles.
- D: None of the above.

11. **The points with position vectors $14\hat{i}-13\hat{j}$, $12\hat{i}-5\hat{j}$ and $a\hat{i}+11\hat{j}$ are collinear if a equals**

- A: 8
- B: 13
- C: -5
- D: -9

12. **Angles α , β and δ are direction angles of a single vector only if?**

- A: $\cos^2\alpha = \cos^2\beta = \cos^2\delta$
- B: $\cos^2\alpha = \cos^2\beta + \cos^2\delta$
- C: $\cos^2\alpha + \cos^2\beta + \cos^2\delta = 0$
- D: $\cos^2\alpha + \cos^2\beta + \cos^2\delta = 1$

13. **Let $\vec{a}=\hat{i}-\hat{k}$, $\vec{b}=x\hat{i}+\hat{j}+(1-x)\hat{k}$ and $\vec{c}=y\hat{i}+x\hat{j}+(1+x-y)\hat{k}$, then $[\vec{a}\ \vec{b}\ \vec{c}]$ depends on**

- A: Only x
- B: Only y
- C: Both x and y
- D: Neither x nor y

TEST 4

1. **Unit vector in the direction of vector v = [-3,-4] is?**

- A: -3/5 i - 4/5 j
- B: -3/5 i + 4/5 j
- C: 3/5 i - 4/5 j
- D: 3/5 i + 4/5 j

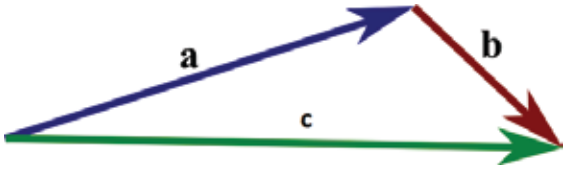
2. **Let a = 2i + j + k, a vector c perpendicular to a is?**

- A: $\frac{1}{\sqrt{2}}(-j+k)$
- B: $\frac{1}{\sqrt{3}}(i+j-k)$
- C: $\frac{1}{\sqrt{5}}(-i-j-k)$
- D: $\frac{1}{\sqrt{2}}(i-2j)$

3. **The area (in square units) of the parallelogram whose diagonals are $\vec{a}=\hat{i}+\hat{j}-2\hat{k}$ and $\vec{b}=\hat{i}-3\hat{j}+4\hat{k}$**

- A: √7
- B: √11
- C: √14
- D: Cannot be determined from the given information.

4. **In the figure below vector b is given by?**



- A: c + a
- B: c - a
- C: a – c
- D: None of the above.

5. **Let $\alpha = (x + 4y)\vec{a} + (2x + y + 1)\vec{b}$ and $\beta = (y - 2x + 2)\vec{a} + (2x - 3y - 1)\vec{b}$, where $\vec{a}$ and $\vec{b}$ are non-zero, non-collinear. If $3\alpha = 2\beta$, then**

- A: x= 1, y = -2
- B: x= -2, y = -1
- C: x= 2, y = 2
- D: x= 2, y = -1

6. **For two position vectors ā and ƀ. The coordinates of position vector dividing the line between ā and ƀ in ration 1 : 1 would be?**

- A: (ā - ƀ) / 2
- B: (ā + ƀ) / 2
- C: (ā + ƀ) / 4
- D: (ā - ƀ) / 4

7. **If magnitude of vector ā = 25 the ā.ā = ?**

- A: 5
- B: 25
- C: 625
- D: 0

8. **Which of the following is not a defined quantity?**

- A: i.i / k.k
- B: i.j / j.j
- C: i.i / i.k
- D: All of them are defined quantities.

9. **If ā.i = 0 and ā.j = 0 and ā.k = 0 then value of ā is?**

- A: i + j + k
- B: [-1,-1,-1]
- C: Unit vector.
- D: Null vector.

10. **A particle acted upon by forces $3\hat{i} + 2\hat{j} + 5\hat{k}$ and $2\hat{i} + \hat{j} - 3\hat{k}$ is displaced from a point P to a point Q whose respective position vectors are $2\hat{i} - \hat{j} - 3\hat{k}$ and $4\hat{i} - 3\hat{j} + 7\hat{k}$. The work done by the force is**

- A: 16
- B: 24
- C: 36
- D: 38

11. **Value of [k, i, j] is?**

- A: 0
- B: 1
- C: -1
- D: √-1

12. **Area of a parallelogram which has vectors i and i + j as the adjecent sides is?**

- A: ½
- B: 1
- C: 2
- D: √2

13. **If ā x ƀ = i + 2j + 2k then ƀ x ā= ?**

- A: 1/3i + 2/3j + 2/3k
- B: -i - 2j - 2k
- C: 2i + 2j + k
- D: None of the above.

14. **If ā = ƀ then the value of triple scalar product ā.(ƀ x c) is?**

- A: 0
- B: 1
- C: -1
- D: ā.ƀ

15. Which of the following quantities is undefined?

- A: (i.i) / (i x j)
- B: (i.j) / (j.j)
- C: (j x k) / (i x j)
- D: (i x k) / (j x j)

16. Which of the following statement is true?

If a.b = 0 a and b are parallel, If a x b = 0 then either a or b must be zero,

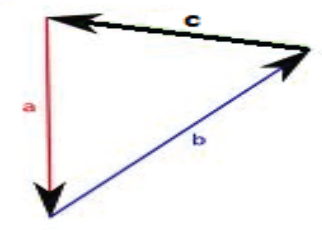
If a. (b x c) = 0 then a, b and c are coplanar.

- A: iii only
- B: i and ii only
- C: ii and iii only
- D: i, ii and iii

17. If $u = 2\hat{i} - 4\hat{j} + 5\hat{k}$ and $v = 4\hat{i} - 3\hat{j} - 4\hat{k}$ then *u* and *v* are?

- A: Parallel
- B: Perpendicular
- C: Equal
- D: Opposite

18. Which of the following is true about the vector diagram given below?



- A: c = a + b
- B: c = a - b
- C: a + b = 0
- D: a + b + c = 0

19. Which of the following position vectors have same magnitude?

a= [3,-4,2], b = [-3, 4, -2], c = [2, 4, 3]

- A: a and b
- B: a and c
- C: All have same magnitude.
- D: None of the has same magnitude.

20. In a parallelogram, the cross product of two adjacent vectors AB = i + 2j - 2j and BC = -2i + 2j + k is : 6i + 3j + 6k. The area of the parallelogram is?

- A: 4.5
- B: 9
- C: 15
- D: 18